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Measuring the Well-Being of the Poor

Demographics of Low-Income Households

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Abstract

The economic well-being of the U.S. population with incomes below 130 percent of the official poverty guideline is of special interest to policymakers and food assistance program administrators. For example, the Food Stamp Program uses gross income below this level as one of several criteria for determining eligibility for program benefits. This study employs alternative welfare measures, including the Sen index, to assess the economic status of the low-income population and to track changes in welfare status over time. In general, welfare measures of households with income no greater than 130 percent of the poverty line improved slightly between 1981 and 1995. The study also assesses which demographic characteristics that describe these low-income households have the largest impact on the welfare measures. This demographic analysis is useful for identifying household types that could merit special attention in designing strategies such as job training or food stamp education and outreach.

Keywords: Food stamps, demographics, low-income households, welfare measures.

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Summary

The Food Stamp and Sehool Lunch Programs both give a special status to the population with incomes below 130 percent of the official poverty guideline. The Food Stamp Program uses gross income below this level as one of several criteria for determining eligibility for program benefits. It is, therefore, of particular interest to measure the welfare status of the American population with incomes below this level, and to track changes in this welfare status over time. For example, measuring changes in welfare status allows us to examine the success of the Food Stamp Program in lessening the dispersion of income among all poor households.

A methodological approach well-suited for this purpose has been developed by Amartya Sen (1992). Using a particular poverty cutoff—such as 130 percent of the official poverty guideline—Sen's social welfare index combines three other measures of welfare: (1) the number of people who are poor by this standard, (2) the depth of their poverty, and (3) the degree of inequality in the distribution of income within this group. Sen's index is particularly appropriate for social welfare measurement when the analyst wants to give a special status to the welfare of people with the lowest incomes.

In the first main empirical section of this paper, we report estimates for Sen's soeial welfare index and its three component parts for 1981 through 1995. In general, we find that welfare measures of households with income no greater than 130 percent of the poverty line improved slightly between 1981 and 1995. We also find, using these measures, that income inequality was less over this period for households participating in the Food Stamp Program than for non-participating households. This indicates success in encouraging the neediest families to participate in the Food Stamp Program versus those families at or near 130 percent of the poverty line, even though all eligible households are encouraged to participate.

In the second main empirical section of this report we investigate the statistical effect of a particular household demographic characteristic on the social welfare status of low-income Americans, as measured using the above methods. The demographic variables we control for are region, race, age, family size, one-person households, head of household with and without a high school diploma, and the number of earners in a household. For this purpose, we estimate a regression model of the demographic determinants of income, where income is measured as a proportion of 130 percent of the official poverty guideline. This regression model provides estimates of the effect of each explanatory characteristic on income status, while holding constant all other household demographic characteristics.

We then conduct a series of six hypothetical illustrations, called counterfactual analysis, of how social welfare would be affected if we could redress the income disadvantage accounted for by each of the six demographic characteristics. For example, our regression model indicates that the demographic characteristic "household headed by a person with a high school education or less" is associated with a measurable disadvantage in terms of household income. Suppose it were not the case that this demographic characteristic was associated with this income disadvantage. What, then, would be the prevalence of poverty, the degree of inequality, and the level of social welfare as measured by Sen's index? We find the number of poor households declines by almost 43 percent in the counterfactual case where "head of household without a high school education" provides no income disadvantage.

Introduction

This report explores the major demographic characteristics that describe households with incomes of 130 percent or less of the poverty line by statistically analyzing household data from 1981-95.[1] The 130 percent or less cut-off is of special interest because it is these households that meet the gross income test for food stamps. The U.S. Department of Agriculture (USDA) administers the food stamp program in order to ensure that American households have the opportunity to consume a nutritious and healthy diet, and food stamps increase the real income of participating households. USDA allocates over one-quarter of its annual budget to food stamps for eligible households that choose to participate in the program.

Both Federal and State governments are concerned that food stamp administrative dollars be allocated to maximize the expected program benefits. A better understanding of the dominant demographic characteristics that distinguish program-eligible households may assist in designing approaches and targeting beneficiaries so as to enhance the program's efficiency and effectiveness.

More specifically, the income requirement for food stamp eligibility is that household income cannot be greater than 130 percent of the poverty line, given household size, for all households without elderly members.[2] In addition, households may have only $2,000 in countable assets unless one or more members of the household are 60 years or older, in which case they can have $3,000 in countable assets. This asset requirement is not taken into account in our study, and so we may overestimate the number of households actually eligible to receive food stamps. This overestimation is likely to be constant over time, however, and our primary purpose in looking at households that meet the gross income test is to identify those households that may be chronically poor. In this regard, "eligible for food stamps," "household income below 130 percent of the poverty line," and "poor households" are synonymous in this report.

The regression technique that we use allows us to isolate the influence of any one demographic variable on a household's poverty status, while holding other determining variables constant. Using this technique, we estimate the impacts of demographic characteristics on four different indicators of poverty, or welfare measures: the head-count ratio, which represents the percentage of poor households in a population; the income gap, which measures the deviation of income from the poverty line; the Gini coefficient, which measures income inequality; and the Sen index, which combines the headcount, income gap, and Gini coefficient into one summary measure. By showing which demographic characteristics have the largest impact on these welfare measures, we can identify household types that could merit special attention in designing strategies to increase the effectiveness of welfare-enhancing programs.

Strategies could include educational or job training opportunities, which potentially raise income levels, or encourage food stamp participation by eligible households that have chosen for some reason not to participate. Success in enhancing participation would increase household income by the value of the food stamps and ensure that the household has adequate resources to purchase a healthy and nutritious diet. Better diets and nutrition may contribute to long-term welfare gains for society by increasing work productivity, reducing medical costs, and promoting the learning ability of children.

Food stamp participation may also affect the dispersion or disparity of income in the population. One contribution of the analysis in this report is an assessment of the income dispersion among food stamp program participants, using the Gini coefficient measure, and of how the value of the stamps affects this disparity measure.

[1] At the start of this study we only had data for 1981-95, which is before reform of the Food Stamp Program.

[2] Households with elderly members may have higher income, but few participating households have this higher income. All eligible households must have net income (gross income less defined program deductions) less than 100 percent of the poverty line.

Literature Review

Most studies that analyze the population eligible for food stamps fall into two categories. The first group of studies analyzes the impact of stamps on food spending. This type of study usually concerns itself with the marginal impact of food stamps on food spending in eligible households. A well-known finding is that the marginal propensity to spend from food stamps is greater than the marginal propensity to spend from cash for households that do not spend all of their food stamps in a given month. That is, they will spend all their cash first and keep some food stamps in reserve. Why this is so has never been fully explained, although several theories exist. An excellent review of studies of this type can be found in Fraker (1990).

The other type of study is concerned with food stamp participation. These studies usually examine the determinants of participation among low-income or food stamp-eligible households and usually employ multivariate analysis or compare the characteristics of participants and nonparticipants in the Food Stamp Program. Such studies have generated a fairly consistent set of findings: that food stamp participation rates are highest among nonwhite and nonelderly people living in households that are leased or rented, are low income, include children, and are eligible for the highest food stamp benefits. Gleason et al. (1998) is an excellent example of a study of this type.

Our study has a different focus and is a novel contribution to the food stamp literature. We look at the characteristics of the total population that meets the income requirement for participating in the food stamp program, and we then estimate the importance of each demographic characteristic on several measures of poverty using a regression technique. The exercise allows us to identify which demographic characteristics are most typical of large numbers of the poor who are eligible to participate in the Food Stamp Program. In this way, private or government entities concerned with the alleviation of poverty can identify those household types to target with special programs, such as worker training or food stamp outreach, so as to have the most success in reducing poverty.

The technique employed in this report is an advance on the usual approach to studying income inequality. The usual approach to measuring the impact of a variable on the level of inequality is to use a decomposable inequality index. While widespread and useful, the technique of decomposition is not without limitations. For example, if one looks at income inequality and decomposes the Gini coefficient by race, then one completely ignores the correlations between race, education, age, and even region of residence. Hence, the decomposition technique does not lead the researcher to the "net effect" of the variable in question. As noted by Bishop, Formby, and Smith (1997), a decomposable index is appropriate when the intent of the researcher is to identify "gross" effects correlated among several variables. However, if the intent of the researcher is to present an uncorrelated effect, then a regression-based technique must be employed. By using regression analysis we are able to report the net effects of selected demographic variables on, in this case, four alternative measures of inequality.

Economic Concepts of Social Welfare and Inequality

This section presents some relevant economic concepts and draws heavily upon work by Deaton (1997). Perhaps the easiest way to explain the economic background of inequality and poverty measures is to start with the concept of a social welfare function. This is a concept that provides a consistent way to think conceptually about welfare and inequality measures. We can denote social welfare by W and write it as a nondecreasing function of all the income for the population denoted by x. Thus,

$$W = V(x1,x2,...xn),$$

where n is the population size. Hence, we wish to maximize W or welfare, which is a function of V, or more directly of household income. If we assume V to be increasing in each of its arguments, social welfare is assumed to be greater when at least one household is better off and no household is worse off. Sometimes this assumption is slightly changed, and we assume that the social welfare function W is unresponsive to changes in welfare among the nonpoor. In this case, we assume V to be nondecreasing in each of the arguments, x. This concept of nondecreasing social welfare becomes relevant in our discussion of poverty measures.

There are two other properties that may define social welfare functions that should be noted. The first is that the social welfare function is a list of welfare levels in society. This simply means that welfare does not depend on which household has what level of income in society and is often referred to as the property of symmetry or anonymity. Second, and perhaps most important, society and policymakers are usually assumed to prefer more-equal distributions to less-equal distributions. If society believed that any inequality were undesirable, then W, as defined above, would be maximized when all incomes were equal. Lacking a desire for complete equality, economists usually assume that any transfer of income from a wealthier household to a poorer household will increase social welfare. This is known as the "principle of transfers."

In order to transfer from welfare to inequality measures, it will be helpful if we define our welfare function. Hence, we can let:

$$W = \mu V\left(\frac{x1}{\mu},...\frac{xn}{\mu}\right),$$

where μ is the average of the x's or average income. Defining the welfare function this way gives a separation between the average value of household income and the distribution of that income. This allows us to talk about changes in social welfare as changes in the average value of income and some acceptable measure of inequality. If we choose a functional form for W, such that $V(1,1...1) = 1$, then if everyone had the mean level of welfare, social welfare would also equal that value. From this assumption, we can surmise that if the income distribution is unequal, then social welfare cannot be greater than the average of the distribution of income. Hence, with an unequal distribution of income, the social welfare function can be written as:

$$W = \mu(1 - I),$$

where I is some appropriate measure of inequality. One way to think about the social welfare function as written above is that is it the cost of inequality. I is thus the measure of inequality, taking the value of zero when the income is equally distributed and increasing with disequalizing transfers. Note that I is not a measure of welfare. It is only part of the equation. Hence, inequality might increase even as average income becomes larger, thereby increasing social welfare.

This report will use one measure of inequality: The Gini coefficient. This measure is desirable from the point of view that it satisfies the principle of transfers. The Gini coefficient can be written as:

$$G = \left(\frac{n+1}{n-1}\right) - \left(\frac{2}{n(n-1)\mu}\right) x \sum_{i=1}^{n} \rho i xi,$$

where ρ is the rank of household i in the income distribution, with the household with the highest income having a rank of 1. Note, that if everyone has the same income, m, the Gini coefficient, G, is zero, while if one person has all the income, the Gini coefficient would be 1. Hence, low values of the Gini are associated with more equal distributions of income.

Measures of Poverty

The social welfare function we have presented above takes into account the income of all households. However, there is no requirement that we look at all households. Rather, we can limit our concern to those households at or below the poverty line, in effect, giving no weight to households above it. However, it should be recognized that these low-income measures are special cases of social welfare measures. In effect, we are relaxing our definition of inequality in the social welfare function and attempting to measure the degree of poverty in society. This is the case alluded to earlier where we consider our welfare function, W, to be nondecreasing in each of its arguments. Hence, our goal remains the same, to maximize social welfare.

The current study looks at three measures of poverty or low income and applies them to households with no more than 130 percent of poverty-level income. These measures are the headcount, the minimum needs gap, and the Sen index. The headcount is simply:

$$H = \frac{q}{n},$$

where q is the number of poor households in society and n is the total number of households. Given a poverty line, the headcount ratio is at best a limited measure of poverty. Its shortcoming is that it does not take into account the degree of poverty; that is, the headcount does not give any indication of how severe poverty is in terms of lack of income. In addition, the headcount ratio, H would be unaffected by a policy that might make the poor even poorer.

The minimum needs gap is a measurement that attempts to overcome the shortcomings of the headcount. This measurement can be written:

$$P = 1 - \Theta$$

where Θ is the arithmetic mean of the ratio of household income to the poverty line or other measure of minimum needs. (In this report, P it is the ratio of household income to 130 percent of the poverty line). The minimum needs gap can be interpreted as the average percentage deviation of income from the poverty line for the poor population (Blackburn, 1990). Hence, the minimum needs gap as defined above provides a measure of the severity of poverty. However, it does not depend on the actual number of poor people and will not change when the numbers of poor are increasing or decreasing.[3] In addition, transfers from poor to nonpoor, or from poor to poor who then become nonpoor, will increase the income gap. But transfers among the poor that make the distribution of income more unequal will not affect the income gap. The fact that the income gap does not take into account the actual numbers of the poor or income transfers among them is a severe shortcoming.

In an attempt to rectify the above problems, Sen (1992) proposed a poverty measure that is a combination of the headcount, income-gap, and Gini coefficient. This measure of poverty can be written:

$$S = (H \times G) + P \times (1 - G).$$

Written this way, the Sen index, S, is shown to be the average of the headcount and the income-gap measures weighted by the Gini coefficient of the poor. If there were no income inequality among the poor, G would be zero and the Sen index would reduce to the income-gap measure. Conversely, if only one household among the poor had all the income, G would be equal to one and the Sen index would reduce to the headcount. Given a population somewhere between these extremes, the Sen index takes into account the numbers of the poor, their shortfall in income relative to the minimum needs line, and the degree of inequality in the distribution of their income.

The above measures of inequality and minimum needs are not the only ones used by social scientists. Other measures do exist, and each has both strong and weak points for the job that it was designed to do. (For a review of various measures of poverty, see Foster and Sen (1997) and Cowell (1995). However, in this report, where we look at the demographic characteristics of the population eligible for food stamps, we make use of the measures that we set for the above. While not perfect, they do allow the researcher to describe the different dimensions of poverty or minimum needs in our society.

[3] A reviewer pointed out that this is not true if all households who have zero income are removed from the data.

Methodology of Study

In the first part of this empirical study, we look at what has actually occurred to Sen's welfare index and its component parts between 1981 through 1995 for households with income no greater than 130 percent of the poverty line. Any household with a ratio of one or less of household income to 130 percent of the poverty line would meet the gross income test for food stamp eligibility. In addition to this, we look at household and per capita income as well as household size. In the second half of this empirical report, we employ multivariate statistical techniques to investigate the influence of demographic factors. Using data from the Consumer Expenditure Survey, we estimate regression models for every other year beginning in 1981 and ending in 1995. (See appendix A for a list of the estimated parameters by year.) Hence, we estimate a model that can be symbolically written as:

$$\frac{Household\ \text{Income}}{130\%\ \text{Poverty Line}} = \beta 0 + \beta 1 * NE + \beta 2 * MW + \beta 3 * S + \beta 4 * Black + \beta 5 * Age + \beta 6 * Age\text{Squared} + \beta 7 * \text{FS} + \beta 8 * \text{FH} + \beta 9 * \text{SP} + \beta 10 * \text{OF} + \beta 11 * \text{NOHS} + \beta 12 * \text{HS} + \beta 13 * \text{NOE} + \varepsilon,$$

Where:

NE	=	Dummy variable for the Northeast,
MW	=	Dummy variable for the Midwest,
S	=	Dummy variable for the South,
Black	=	Dummy variable for Blacks,
Age	=	Age of household head,
Age Squared	=	Age of household head squared,
FS	=	Family size,
FH	=	Dummy variable for a female-headed household,
SP	=	Dummy variable for a one-person household other than older females,
OF	=	Dummy variable for single females 50 years and older,
NOHS	=	Dummy variable for head of household without high school diploma,
HS	=	Dummy variable for head of household with a high school diploma,
NOE	=	Number of earners in the household,
ε	=	Error variable for the model,

and the B's (lower-case Greek Beta in the equations) are coefficients estimated by the regression technique. Each B represents the net effect of that variable on the ratio of household income to 130 percent of the poverty line, given all the other variables in the model. The effect of any variable not included in the model is captured in the error term of the model.

The above variables were selected a priori because they were thought to represent the main demographic characteristics of poor U.S. households. Regions were added to the regression under the hypothesis that particular areas of the United States may have more poor households than others. Likewise, race was divided into Black and non-Black households on the theory that there are proportionally more poor Black households than non-Black households. Age was entered in a quadratic form since this specification has been shown to provide a good statistical fit in models with income and household composition entered separately. Adding household size to the regression controlled for variations in size between households. It was hypothesized that female-headed households might represent proportionally more poor households than nonfemale-headed households, so this variable was added to the regression equation. Likewise, we hypothesized that one-person households might represent a large proportion of poor households, so this variable was added. From the one-person household group, single females 50 years or older were entered separately, on the theory that older females might represent a growing proportion of the population who might be poor and eligible for food stamps. Household heads were classified as high school dropouts, high school graduates, or college graduates (including graduate degrees).[4] These were entered under the hypothesis that high school dropouts are severely disadvantaged in terms of human capital and more likely to be poor than those heads of household with a high school education or more. Finally, the number of wage earners in a household was entered under the assumption that the more wage earners there are, the less likely the household will be poor.

After estimating the above model, we calculate summary statistics for each year. These include the headcount ratio, the income gap ratio, the Gini coefficient for the population eligible for food stamps, the Sen index, household size, real household income (adjusted for inflation), and real per capita income. Then using

[4] Household heads with some college were classified as having a high school diploma.

our regression models, we isolate the effects of selected demographic factors on the ratio of household income to 130 percent of the poverty line. In reality, we are examining the counterfactual case whereby we isolate the net influence of selected demographic variables on the dependent variable (the ratio of household income to 130 percent of the poverty line). We do this by using the estimated parameter values from the regression models and then constructing a vector of adjusted eligible households by removing the net influence of any selected demographic factor (Bishop, Formby, and Smith, 1997). Since the estimated sign of these selected demographic factors is negative, these attributes really represent a disadvantage in terms of the ratio of household income to the poverty line. To give a concrete example, if we want to know the effect of single-person households (which has a negative coefficient in our models) on our welfare measures, we can create a new variable, P^*, by taking the ratio of household income to 130 percent of the poverty line, P, and adding the statistically estimated coefficient from the single household variable, B_9. Hence, we would have:

$$P^* = P + \beta 9^*(Single\ Person).$$

The effect of creating P^* is to isolate the "single person" effect, or more technically, to remove the net income disadvantage associated with single-person households. All other attributes of single-person households, such as education and race, remain. We then determine the net effect of isolating this demographic characteristic associated with an income disadvantage by recalculating the summary statistics for this modified variable and comparing them to the original calculations. In this way, we can identify which demographic characteristics have the largest impact on the size of the population eligible to receive food stamps. We would like to make the point that this is not the same as dropping one demographic group, say singles, from the regression equation and then reestimating the equation. This is because any demographic group will be composed of more than one demographic characteristic. Here we wish to identify those demographic characteristics most responsible for increasing the above-mentioned measures of poverty. While we cannot observe such an exercise in the "real world," it is the case that the regression coefficient represents the net effect of that variable on the dependent variable, all other things being equal.

We would like to note that income is reported here on both a household basis and a per capita basis. Food stamp eligibility is based on household income given household size. And indeed, an argument can be made that household welfare is largely determined by household income, even though some economists prefer to discuss social welfare on a per capita basis. Both arguments have merit. However, it is problematical to compare household incomes when household size differs; therefore, we also report income on a per capita basis to facilitate such discussions.

Database and Descriptive Statistics

Our statistical analysis is based upon data taken from the Consumer Expenditure Survey (CES) for 1981-95 (every other year). The CES grew out of consumer expenditure surveys of American households that the U.S. Department of Labor's Bureau of Labor Statistics (BLS) had been conducting periodically at about 10-year intervals since 1888.

The CES is composed of two components, each with its own questionnaire and sample. The first is an interview panel survey in which each of approximately 5,000 households is surveyed every 3 months over a 1-year period. The second is a diary survey of approximately the same sample size in which households keep an expenditure diary for two consecutive 1-week periods. The diary survey obtains data on small, frequently purchased items normally difficult to recall, consisting of food and beverages, tobacco, housekeeping supplies, and nonprescription drugs, personal care products and services, fuels, and utilities. Both surveys have a complete demographic profile of each household and its members. In this study, we use data from the diary survey. From our original sample, we eliminated households that did not have positive income. In addition, we subtracted the value of any food stamps that the household received in order to determine household income.

The Current Population Survey (CPS) is actually the benchmark dataset to use for income and the distribution of that income. The sample size of the CES is smaller than the CPS, and hence the CES income estimates are less accurate. Many studies have used the CES, however, including work on income inequality by Deaton and Paxson (1994). Furthermore, researchers have compared the CES income estimates with those of the CPS and the National Income and Product Accounts (NIPA). Most have found an underreporting in income in the CES that is roughly constant over time (see Attanasio, 1998).

The important question is whether the results found in this study would be altered if the CPS were used instead of the CES. To get some idea of the correlation between the two datasets, the growth rate in reported household income from the CES was compared with the growth in personal income in the NIPA. For 1981-95, the eorrelation coeffieient between the two datasets was 0.72, which is nearly identical to what Attanasio (1998) found. Likewise, the correlation was calculated for the growth in the headcount of the number of households at or below 130 percent of the poverty line in our study with the growth rate of the number of all families in poverty as reported by the U.S. census. This correlation was 0.77. These correlation coefficients indicate that the CES is a fairly representative sample, relative to the NIPA and the families in poverty data. Hence, we doubt if the conclusions reported below would change if we used the CPS dataset. In any case, in the results reported below, we calculate a base set of statistics and report percentage changes from that base after netting out the influence of selected demographic factors.

Table 1 contains selected unweighted average values for both the total population and those who meet the gross income test for food stamps. Households eligible for food stamps are broken out into those who participate in the food stamp program and those who do not. Regional statistics are very similar for both groups, with slightly more of the eligible-for-food-stamp population living in the South and slightly less of it living in the West. In our sample, Blacks represent about 11 percent of the population and non-Blacks about 89 percent. However, in the eligible for food stamp population, Blacks represent about 20 percent of the population and non-Blacks about 80 percent. In households that actually receive food stamps, about 34 percent are Black, while about 66 percent are non-Black.

Age and family size are very similar in the two populations. The average age of the household head was 46 in the total population, with a household size of 2.6 people. This compares with an average age of 47.5 for the household head in the eligible-for-food-stamp population, and an average household size of 2.4 people. In households that actually receive food stamps, the average age of the household head was about 42 years with an average household size of 3.2 persons.

Female-headed households comprise about 6 percent of the total population but represent almost 14 percent of those households eligible for food stamps. However, of households that actually receive food stamps, almost 38 percent are female-headed.

One-person households have been sorted into two groups noted above: Single females 50 years of age or older and all other singles. As noted earlier, we hypothesize that single older females may be a segment of the population that is growing proportionally larger over time. All single households represent about

Table 1—Comparison of selected means for the total population and the population eligible for food stamps, 1981-95

Item	Total population	Eligible for food stamps total eligible population	Eligible for food stamps: Receives food stamps	Eligible for food stamps: Does not receive food stamps
		Percent		
Northeast	20.5	20.2	20.0	20.3
Midwest	25.2	26.1	28.5	25.3
South	29.0	32.0	33.9	31.4
West	25.3	21.7	17.7	23.0
Black	11.1	21.0	34.4	16.6
Non-Black	88.9	79.0	65.6	83.4
Age of head	46.1 years	47.6 years	42.2 years	49.3 years
Family size	2.6 persons	2.4 persons	3.2 persons	2.1 persons
Female-head	5.9	13.7	37.6	5.9
One-person households (excluding older females)	19.0	24.3	8.5	29.5
Single older females	9.7	20.7	13.4	23.0
No high school diploma	21.3	42.9	54.2	39.2
High school diploma	53.5	48.8	43.1	50.7
College degree or higher	25.1	8.3	2.8	10.1
Earners per household	1.4 persons	.8 person	.6 person	.9 person

Source: U.S. Department of Agriculture, Economic Research Service.

29 percent of the total population, but they account for 45 percent of the population eligible for food stamps. Of this total, about 21 percent are older females, while the remainder of the group is made up of all other one-person households. In households that actually participate in the food stamp program, about 13 percent are older females, while all other singles represent about 24 percent of program participants.

Approximately 22 percent of the total U.S. adult population has never received a high school diploma. This includes people who never attended school, as well as those who never completed the 12th grade. In the eligible-for-food-stamp population, approximately 43 percent have not completed high school. However, fully 54.2 percent of all householders who participate in the food stamp program do not have a high school diploma. In the total population, 53.5 percent are high school graduates, whereas this figure falls to about 49 percent in the population eligible for food stamps. In households that receive food stamps, about 43 percent are high school graduates. About 25 percent of the population has a bachelor's degree or higher, but this figure falls to about 8 percent in the population eligible for food stamps, and approximately 3 percent of food stamp recipients are college graduates. Finally, it is not surprising that households in the total population have about 1.4 income earners, whereas households eligible for food stamps or that actually receive food stamps average less than one income earner per household.

Welfare Measures and Inequality Between 1981 and 1995

Table 2 represents the baseline analysis for households that meet the gross income test to receive food stamps. This table contains the headcount ratio, income gap, Gini coefficient, Sen index, real household income, real per capita income, and household size. In addition, we have calculated the Gini coefficient for those households that participate in the food stamp program. This Gini coefficient is calculated after adding the actual value of food stamps received to household income. This statistic will then give an indication of how effective the food stamp program is in evening out the dispersion of income among food stamp recipients. However, the main focus of this report is still on the demographic characteristics of the population eligible for food stamps, regardless of whether they participate in the food stamp program. We also note that a standard error could be calculated for the statistics that we report. The easiest way to do this would be by bootstrapping our estimates. However, the majority of studies that report such statistics do not usually calculate a standard error.

The headcount ratio indicates that the percentage of households eligible to receive food stamps declined from 27 percent in 1981 to 21 percent in 1989, before rising to 24 percent in 1993 and declining again to 22 percent in 1995. For the entire sample period, the headcount averaged 24 percent. Importantly, the income gap also declined from 44 percent in 1981 to 38 percent in 1995 and averaged 41 percent between 1981 and 1995. This statistic represents the average percentage deviation of income from 130 percent of the poverty line for the poor population. The Gini coefficient measures the degree of inequality among the poor, and this, too, fell from 0.36 to 0.32, averaging 0.33 for all years. The Sen index summarizes the headcount, income gap, and the Gini coefficient, so it too fell from 0.38 in 1981 to 0.33 in 1995, with an average value of 0.36. Real income for households eligible for food stamps has increased over this period from $4,735 in 1981 to about $5,387 in 1995. This is a very modest increase of 14 percent, whereas per capita income ranged from $2,058.70 in 1981 to $2,154.65 in 1995, an increase of about 5 percent.

In order to determine if a group is better or worse off over time, one has to look at measures of dispersion along with a measure of average income. In looking at the Sen index, real household income, and real per capita income, we can conclude that poor households in 1995 were slightly better off than in 1981. First, there were proportionally fewer poor households, and second, they had more income in real terms, although the income gains were rather modest as indicated above. However, we do need to note that those who left the ranks of poor households, approximately 5 percent of all households, were the real winners. A reduction in the number of households at or below 130 per-

Table 2—Welfare measures of food stamp-eligible households (incomes less than or equal to 130 percent of the poverty line)

	Components of Sen index							
Year	Headcount ratio	Income gap	Gini coefficient	Sen index	Gini coefficient with food stamps	Real household income	Per capita income	Household size
						------1981 dollars------		Number
1981	0.27	0.44	0.36	0.38	0.35	4,735.02	2,058.70	2.3
1983	.26	.42	.33	.37	.31	4,832.78	2,101.21	2.3
1985	.25	.42	.33	.36	.32	4,986.12	2,077.55	2.4
1987	.22	.41	.31	.35	.30	5,039.55	2,099.81	2.4
1989	.21	.40	.31	.34	.30	5,095.61	2,123.17	2.4
1991	.23	.41	.32	.35	.30	5,094.25	2,037.70	2.5
1993	.24	.40	.32	.35	.30	5,252.13	2,100.85	2.5
1995	.22	.38	.32	.33	.31	5,386.62	2,154.65	2.5
Average	.24	.41	.33	.36	.31	5,052.76	2,094.21	2.4

Source: U.S. Department of Agriculture, Economic Research Service.

cent of the poverty line would also be consistent with an increase in average income for the total population, and therefore, an increase in general welfare. Note too that the Gini coefficient for households that participate in the food stamp program is slightly below the Gini coefficient of all households eligible for food stamps. The Gini coefficient for households that received food stamps was about 6 percent below the Gini coefficient for all households eligible for food stamps in 1983 and about 3 percent below in 1995 and averaged about 6 percent below for the entire time period. This indicates that those households derived positive benefits from participating in the Food Stamp Program and that needy families other than those at or near 130 percent of the poverty line have participated and realized higher average incomes.

Counterfactual Impacts of Selected Demographic Factors on Welfare Measures and Inequality

Tables 3-8 present the same summary statistics as table 2, except that we have isolated the impacts on the various welfare measures of one demographic factor in each table using our estimated statistical model. Again, we emphasize that we are statistically controlling for one demographic characteristic at a time, which is not the same as eliminating a specific demographic group from the dataset, say one-person households, and then recalculating the welfare statistics. This is because any demographic group would embody more than one demographic characteristic, like race and region of residence. Rather, our technique lets us statistically isolate the net effect of various demographic characteristics. We can then isolate the income disadvantage (in the case of coefficients with a negative sign) of these households by the technique discussed earlier. We then recalculate our poverty statistics for those households who remain eligible for food stamps and report the percentage change from our base table (table 2). It is important to note that decreasing the population eligible for food stamps is generally consistent with increasing average household income for the total population and thus with total welfare. Hence, in this report we emphasize the impact on the headcount ratio of netting out a demographic effect, but we also recalculate the other welfare measures to determine the potential economic well-being of those households remaining in the food stamp-eligible population.

Table 3 shows the welfare measures for food stamp-eligible households under the counterfactual case where race provides no income disadvantage to the household. In other words, if the net income disadvantage associated with Black households, all other household characteristics held constant, could be redressed, the welfare measures would deviate from the base measures by the figures reported in the table. The headcount ratio indicates that the proportion of low-income households would decline about 11 percent for 1981 and about 9 percent for 1995, and would average a decline of about 8 percent relative to the baseline analysis. Likewise, the income gap for the remaining households eligible for food stamps would be about 9 percent less in 1981 and about 8 percent less in 1995 and average approximately 9 percent less over the sample period. Interestingly, the Gini coefficient for this table is about the same as the baseline calculation in that it rises by no more than 3.2 percent over the baseline and averages an increase of 1.2 percent. However, the Sen index does decline since both the headcount and income gap measures declined. Relative to the baseline, real income is lower in both household and per capita terms. Hence, if the income disadvantage of Black households could be isolated from the population, only modest reductions in the headcount ratio would be realized.

Table 3–Welfare measures of food stamp-eligible households under the counterfactual case where race provides no income disadvantage

	Components of Sen index						
Year	Headcount ratio	Income gap	Gini coefficient	Sen index	Real household income	Per capita income	Household size
			Percent changes from base				
1981	-11.1	-9.1	0	-10.5	-5.1	-0.8	-4.3
1983	-7.7	-9.5	0	-10.8	-4.1	.3	-4.3
1985	-8.0	-9.5	0	-8.3	-4.0	-4.0	0
1987	-9.1	-9.8	3.2	-11.4	-3.5	-3.5	0
1989	-9.5	-7.5	3.2	-8.8	-3.2	1.0	-4.2
1991	-4.3	-7.3	0	-5.7	-2.7	-2.7	0
1993	-8.3	-7.5	0	-8.6	-4.0	-4.0	0
1995	-9.1	-7.9	3.1	-9.0	-3.0	-3.0	0
Average	-8.4	-8.5	1.2	-9.1	-3.7	-2.1	-1.6

Source: U.S. Department of Agriculture, Economic Research Service.

Table 4 contains the welfare measures after removing the net income disadvantage for households associated with the characteristic "female-headed." If the female-headed household effect could be removed, the number of households eligible for food stamps would decline by approximately 10 to 14 percent for each year in the sample and would average a decline of about 12 percent over the entire period. The income gap would also decline by approximately 2 to 8 percent each year and would average a decline of about 5 percent over the sample period. Again, the Gini coefficient would be little changed, although it would average an increase of about 2 percent between 1981 and 1995. However, the Sen index would decline by approximately 5 to 9 percent each year, with an average decline of about 7 percent. While real household income declines relative to the baseline, per capita income increases between 3 and 7 percent each year. These results are very similar to those for race.

Table 5 presents the welfare measures after removing the net income disadvantage for households associated with the characteristic "one-person, other than older single females." The effect on the headcount ratio is rather dramatic. The headcount ratio would have declined by approximately 44 percent in 1981 and 41 percent in 1995 and would average approximately 40 percent for all years. This would be a large reduction in the number of households eligible for food stamps. However, the effect on the income gap is rather mixed. In the early to mid-1980s, the income gap would have declined by approximately 7 to 16 percent. Thereafter, the income gap would have remained about the same as the baseline, but would average a decline of 5 percent for all years. The Gini coefficient increases for all years except 1985 and 1995, when it is the same as the baseline, and averages an increase of about 5 percent. Because of the dynamic decline in the headcount, the Sen index also declines. This would have ranged from approximately 26 percent in 1981 to about 9 percent in 1995, with an average decline of about 14 percent. On a per capita basis, income was lower relative to the baseline by an average of about 18 percent, but note that per capita income would have increased by a modest 3 percent between 1981 and 1995 for these remaining households. In summary, if this demographic effect could be redressed, there would be a large reduction in the number of households eligible for food stamps, but this would leave behind some hardcore poor households, as measured by the decline in per capita income relative to the baseline.

Table 6 contains the welfare statistics after removing the net income disadvantage for households associated with the characteristic "single females 50 years or older." The reduction in the headcount is not as great as that associated with all other one-person households. Yet, the headcount ratio would have fallen by approximately 19 to 23 percent in each year, with an average decline of about 21 percent. Interestingly, the income gap of those who remained eligible for food stamps would have increased by about 5 percent in each year except for 1989 (about 8 percent). Likewise, the Gini coefficient is larger every year relative to the baseline, with an average increase of about 5 percent. The end result is that the Sen index is very close to

Table 4—Welfare measures of food stamp-eligible households under the counterfactual case where female-headed households provide no income disadvantage

	Components of Sen index						
Year	Headcount ratio	Income gap	Gini coefficient	Sen index	Real household income	Per capita income	Household size
			Percent changes from base				
1981	-11.1	-2.3	2.8	-5.3	-2.1	7.3	-8.7
1983	-11.5	-4.8	3.0	-8.1	-2.7	6.6	-8.7
1985	-12.0	-2.4	0	-5.6	-10.4	4.8	-4.2
1987	-13.6	-7.3	3.2	-8.6	.3	4.6	-4.2
1989	-9.5	-5.0	0	-5.9	.4	4.7	-4.2
1991	-13.0	-7.3	0	-5.7	2.3	6.5	-4.2
1993	-12.5	-7.5	3.1	-8.6	-1.1	3.0	-4.2
1995	-13.6	-5.3	0	-6.1	.9	5.1	-4.2
Average	-12.1	-5.2	1.5	-6.7	-1.6	5.3	-5.3

Source: U.S. Department of Agriculture, Economic Research Service.

Table 5–Welfare measures of food stamp-eligible households under the counterfactual case where one-person households (all one-person households except females 50 years or older) provide no income disadvantage

Year	Components of Sen index			Sen index	Real household income	Per capita income	Household size
	Headcount ratio	Income gap	Gini coefficient				
	Percent changes from base						
1981	-44.4	-15.9	0	-26.3	22.7	-14.5	43.5
1983	-42.3	-11.9	9.1	-21.6	15.6	-31.2	39.1
1985	-44.0	-7.1	0	-13.9	18.1	-14.1	37.5
1987	-36.4	-2.4	12.9	-11.4	10.9	-19.4	37.5
1989	-42.9	-2.5	6.5	-8.8	16.5	-17.8	41.7
1991	-39.1	4.9	3.1	-5.7	16.3	-16.9	40.0
1993	-33.3	-5.0	9.4	-14.3	11.2	-15.8	32.0
1995	-40.9	0	0	-9.1	17.3	-16.2	4.0
Average	-40.4	-5.0	5.1	-13.9	16.1	-18.2	34.4

Source: U.S. Department of Agriculture, Economic Research Service.

Table 6—Welfare measures of food stamp-eligible households under the counterfactual case where one-person households who are females 50 years or older provide no income disadvantage

Year	Components of Sen index			Sen index	Real household income	Per capita income	Household size
	Headcount ratio	Income gap	Gini coefficient				
	Percent changes from base						
1981	-18.5	4.5	2.8	-2.6	4.9	-3.5	8.7
1983	-19.2	4.8	6.1	-2.7	4.7	-7.4	13.0
1985	-20.0	4.8	3.0	0	4.2	-7.3	12.5
1987	-22.7	4.9	6.5	0	4.8	-10.2	16.7
1989	-19.0	7.5	6.5	0	4.8	-10.2	16.7
1991	-21.7	4.9	6.3	0	5.3	-9.2	16.0
1993	-20.8	5.0	3.1	-2.9	5.1	-9.4	16.0
1995	-22.7	5.3	3.1	0	6.4	8.3	16.0
Average	-20.6	5.2	4.7	-1.0	5.0	-6.1	14.5

Source: U.S. Department of Agriculture, Economic Research Service.

that of the baseline index, on average only 1 percent below the baseline. Hence, the headcount would fall, the income gap would widen, the dispersion of household income would increase, and while real household income would increase modestly, real per capita income would fall relative to the baseline. Thus, the net result of removing the income disadvantage of single females 50 years or older would not be as dramatic as for all other one-person households, but it would still have a rather large impact on the total number of households eligible for food stamps (the headcount).

Table 7 contains the welfare measures for food-stamp-eligible households after removing income disadvantage for households associated with the characteristic "household head does not have a high school diploma." Relative to the baseline, the headcount ratio would decline between 37 and 50 percent and would show an average decline of about 43 percent between 1981 and 1995. The income gap presents rather mixed results. Between 1983 and 1987, the income gap for households remaining eligible for food stamps would have risen about 2 percent, while it would have declined

about 2 percent in 1991 and 1993. On average, the income gap would increase by about 1 percent. As a result, the Gini coefficient increases slightly each year except for 1989 and 1995, when it is the same as the baseline, and averages an increase of about 3 percent. The net effect of this is to reduce the Sen index by an average of about 10 percent for all years. Household income for those still eligible for food stamps fell about one percent between 1981 and 1995, whereas per capita income, which is above that of the baseline, rose about 3 percent. Hence, if we could remove the income disadvantage of household heads without a high school education, we would see a rather dramatic decline in the number of households eligible for food stamps.

Table 8 contains the welfare measures for households eligible for food stamps after removing the income disadvantage for households associated with the characteristic "household head has a high school diploma." Once again, this causes a large reduction in the head-count ratio; in fact, it is larger than removing the income disadvantage of households whose heads do not have a high school diploma. Between 1981 and 1995, the head count would have declined between approximately 45 to 54 percent, with an average decline of about 48 percent. However, other than in 1981, the income gap appears to be very similar to the baseline, with an average decline of about 2 percent. Excluding 1981, the Gini coefficient ranges between a decline of about 9 percent and an increase of about 3 percent. Over the entire period, the Gini coefficient declines by about 5 percent. The Sen index is well below that of the baseline, and averages a decline of about 12 percent. Income for those households still eligible for food stamps is very mixed in terms of being above or below that of the baseline, although on average, it is about 1 percent below the baseline on a household basis and about 3 percent below the baseline on a per capita basis. As noted above, it is somewhat surprising that removing the income disadvantage of this variable produces slightly larger changes in welfare measures than removing it for households without a high school diploma. Undoubtedly, a large number of high school graduates are unprepared to make an adequate living upon leaving high school. Still, if this effect could be addressed, there would be a very large decline in the number of households eligible for food stamps.

Table 7—Welfare measures of food stamp-eligible households under the counterfactual case where heads of households without a high school education provide no income disadvantage

	Components of Sen index						
Year	Headcount ratio	Income gap	Gini coefficient	Sen index	Real household income	Per capita income	Household size
			Percent changes from base				
1981	-37.0	4.5	5.6	-7.9	-4.9	4.2	-8.7
1983	-46.2	2.4	3.0	-10.8	-2.7	1.7	-4.3
1985	-44.0	2.4	6.1	-8.3	-1.1	3.2	-4.2
1987	-50.0	2.4	6.5	-8.6	-1.7	-1.7	0
1989	-42.3	0	0	-8.8	-.6	3.7	-4.2
1991	-43.5	-2.4	3.1	-11.4	1.5	1.5	0
1993	-37.5	-2.5	3.1	-11.4	.6	4.8	-4.0
1995	-40.9	0	0	-9.1	-1.2	2.9	-4.0
Average	-42.7	.9	3.4	-9.5	-1.3	2.5	-3.7

Source: U.S. Department of Agriculture, Economic Research Service.

Table 8—Welfare measures of food stamp-eligible households under the counterfactual case where household heads with a high school education provide no income disadvantage

Year	Components of Sen index			Sen index	Real household income	Per capita income	Household size
	Headcount ratio	Income gap	Gini coefficient				
	Percent changes from base						
1981	-44.4	-18.2	-18.3	-26.3	-9.3	-9.3	0
1983	-46.2	-2.4	-6.1	-13.5	2.0	2.0	0
1985	-52.0	0	-9.1	-8.3	1.4	-2.7	4.2
1987	-45.5	-2.4	-3.2	-11.4	1.0	1.0	0
1989	-47.6	-2.5	0	-11.8	2.1	-1.9	4.2
1991	-47.8	0	-3.1	-8.6	-0.7	-0.7	0
1993	-54.2	2.5	-3.1	-8.6	-2.1	-5.8	4.0
1995	-45.5	5.3	3.1	-6.1	-0.4	-4.3	4.0
Average	-47.9	-2.2	-5.0	-11.8	-0.8	-2.7	2.1

Source: U.S. Department of Agriculture, Economic Research Service.

Summary and Conclusions

Descriptive statistics indicate that welfare measures of food stamp-eligible households improved between 1981 and 1995. In 1981, a year of recession, 27 percent of all households met the gross income test for food stamp eligibility, but this figure declined to 22 percent by 1995, a year of economic expansion. This represents a decrease of about 19 percent. Likewise, the income gap, which in this report is the average percentage deviation of income from 130 percent of the poverty line, declined about 14 percent, from 0.44 to 0.38. Even the Gini coefficient, which measures the dispersion of income among the poor, declined almost 11 percent from 0.36 to 0.32. The Sen index, a measure of poverty that weights the headcount and the income gap by the Gini coefficient, declined from 0.38 to 0.33. This represents a 13-percent improvement in this statistic.

Income for households eligible for food stamps also improved over the 1981-95 period. On a household basis, after adjusting for inflation, it rose about 14 percent. However, on a per capita basis, average income rose just 5 percent.

Taken together, the above measures of welfare and the increases in real income for households eligible for food stamps indicate that society was slightly better off in 1995 than in 1981. First, there were proportionally fewer households eligible for food stamps. This indicates that proportionally more households were above 130 percent of the poverty line, and this is consistent with an increase in average income for the total population. In addition, average income for those households still eligible for food stamps also increased, however slightly.

Our counterfactual analysis indicates that large numbers of poor households are comprised of one-person households (and we would include single females age 50 and older) and by households headed by a person with a high school education or less. In contrast, poor households have a smaller proportion of Black, or female-headed households. If policymakers wish to encourage those households that are eligible for food stamps but who do not participate in the program, then our analysis indicates that they could likely recruit the largest numbers of eligible households by trying to influence non-Black, one-person households and those whose heads have a high school education or less. This of course assumes that these household types could be targeted and that all groups that now participate in the food stamp program do so in numbers proportional to their representation in poor households (see our descriptive statistics in table 1). The Gini coefficients for the baseline indicate the success of the Food Stamp Program in lessening the dispersion of income among the poor households that participate in the program.

One question not answered by this study concerns the demographic profile of the one-person households. Are these younger people who are just starting out in their careers and need temporary assistance until they are economically established? Or are the households made up of single people of all ages who are temporarily out of work? If this is the case, not much could be done to ease their plight, in the sense of government intervention, other than to encourage them to participate in the Food Stamp Program if they are eligible. However, it could be the case that this is a group of people who live alone and continually work in low-paying jobs. If many of these households are of the latter type, then this group may represent hardcore welfare recipients who will need government assistance for an extended period. These questions may be answered by analyzing a dataset such as the Survey of Income and Program Participation (SIPP).

Table 9—Estimated regression models 1981-95

Characteristics	1981	1983	1985	1987	1989	1991	1993	1995
Intercept	0.84	1.25	1.57	1.77	1.78	2.24	1.12	1.64
	(.17)	(.22)	(.23)	(.20)	(.24)	(.23)	(.23)	(.26)
Northeast	-.34	-.26	-.14	.11	.20	.19	. 13	.07
	(.06)	(.08)	(.07)	(.06)	(.08)	(.07)	(.07)	(.08)
Midwest	-.22	-.23	-.12	0	.09	-.08	.08	-.03
	(.06)	(.07)	(.07)	(.06)	(.07)	(.07)	(.07)	(.08)
South	-.20	-.06	.02	.14	.07	.02	.17	.03
	(.06)	(.07)	(.07)	(.06)	(.07)	(.06)	(.06)	(.07)
Black	-.43	-.43	-.38	-.46	-.48	-.26	-.42	-.35
	(.07)	(.08)	(.09)	(.08)	(.09)	(.08)	(.08)	(.09)
Age	.14	.13	.13	.11	.12	.10	.13	.11
	(.01)	(.01)	(.01)	(.01)	(.01)	(.01)	(.01)	(.01)
Age squared	-1.37e-3	-1.21e-3	-1.20e-3	-1.10e-3	-1.09e-3	-9.61e-4	-1.19e-3	-1.07e-3
	(7.51e-5)	(9.22e-5)	(9.38e-5)	(8.09e-5)	(9.56e-5)	(8.59e-5)	(8.82e-5)	(9.84e-5)
Family size	-.43	-.46	-.49	-.47	-.47	-.48	-.45	-.48
	(.02)	(.02)	(.03)	(.02)	(.03)	(.02)	(.02)	(.03)
Female head	-.82	-.76	-1.03	-.82	-1.05	-1.03	-.78	-.90
	(.09)	(.11)	(.12)	(.11)	(.13)	(.12)	(.11)	(.13)
Single-person	-.84	-.80	-.87	-.71	-.82	-.94	-.73	-.85
	(.07)	(.09)	(.09)	(.08)	(.09)	(.09)	(.09)	(.10)
Single older female	-1.12	-1.26	-1.31	-.97	-1.21	-1.07	- 1. 10	-1.16
	(.09)	(.11)	(.11)	(.09)	(.11)	(.10)	(.11)	(.11)
No high school diploma	-1.20	-1.60	-1.92	-1.86	-2.00	-2.02	-1.95	-1.90
	(.06)	(.08)	(.08)	(.07)	(.08)	(.08)	(.08)	(.08)
High school diploma	-.75	-1.10	-1.29	-1.19	-1.39	-1.35	-1.34	-1.23
	(.05)	(.06)	(.07)	(.06)	(.06)	(.06)	(.06)	(.07)
Number of earners	48	.60	.55	.56	.58	.56	.58	.58
	(.03)	(.04)	(.04)	(.03)	(.04)	(.03)	(.04)	(.04)
Adj R2	.38	.33	.32	.34	.31	.33	.35	.33
SSE	10,165.57	11,028.23	13,298.20	13,103.09	14,356.78	13,634.25	11,934.49	10,255.64

Numbers in parentheses = Standard errors.
SSE = Sums of squares of error.

Source: U.S. Department of Agriculture, Economic Research Service.

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